Specification: Local geography educator

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Background

The intent of this project is to produce a mobile application capable of teaching local geography to its users. The meaning of local geography in this context is names of villages, city-districts, roads, parks, rivers, schools and such geographical objects, i.e object inside a limited area, like a city. The application can for example be useful for someone who wants to gain better knowledge of the city where they live or where they want to go to. A big focus of this project is to make the application stimulating, entertaining and above all educational.

Several mobile applications for geographical education currently exist. Some examples are Seterra, World Geography, Geo Challenge and MapPie. These are all based on education through quizzes. You are ranked based on the result of a quiz and the goal can be to complete many quizzes with good rankings, get a new high-score or progress to new levels. Such a design enables learning through entertainment and will also be integrated into the application of this project. A defining difference with other applications is this project's focus on local geography, where others usually focus on a global or regional scale, such as continents, oceans, states, provinces and cities.

Description

I plan to use Open Street Map data for creating the exercises, which is fetched through the Overpass-service. The user specifies an arbitrary (size-limited) region on a map, then complete geo-data is fetched for this region and quizzes are constructed and presented to the user. The geo-objects are divided into quizzes based on certain characteristics. A quiz consists of questions like "Which street is Geijersgatan?" or "What is the name of this island?" The question text and a map is presented to the user.

One part of the problem will be to analyze the OSM-data and derive relevant information; object names, locations and categories (road/ park/ school/ island etc). To be able to divide object into quizzes in a sensible way, more info is needed; things like area, length and popularity.

Another problem is to find a way to make the application educational. For this to happen, it also needs to be stimulating. This will likely prove to be a challenging problem and there are several things to keep in mind to avoid pitfalls.

The application will be implemented in Java for Android.

Approach

I'll do a study of existing applications in this area (those I mentioned above) and identify strengths and weaknesses in those, from an educational point of view. Important concepts to keep in mind are the human factors; memory, lazy evaluation, perception, stress-level etc. I'll ask some potential users for their considerations and requests on the finished application. Then I'll create scenario/persona-analyses and from these derive functional and non-functional requirements of the application. I'll decide on a design and create mockups of it using some image processing software.

The OSM-data from Overpass is downloaded as Json and needs to be processed to obtain relevant information. To access the raw data I'll use the Java-library Gson and structure it in arrays of objects. OSM has a free tagging system meaning there are no fixed rules that determines how

objects are tagged. Therefor I'll need to investigate popular patterns in the tags in order to extract e.g a closed set of categories. For this investigation, the online tool Taginfo will likely prove useful. The extracted data along with settings and progress will be preserved when the app is killed by saving it to external storage.

Implementation of the application will be done in Android Studios with version control through Git. Edited embedded interactive maps will be implemented using Mapbox Maps SDK for Android. Finished product will be tested by some potential users for a validation of the educational value, as a follow-up to the initial user considerations.

Relevant courses
- Human-Computer Interaction, 5c – Designing a user-friendly interface.
- Intelligent Interactive Systems, 5c – Touched upon education through computers.
- App Development and Mobility, 7.5c – Developing an Android application.
- Program Design and Data Structures, 20c – Working with a bigger programming projects.
- Imperative and Object-Oriented Programming Methodology, 20c – Object oriented programming with java.

Limitations
A user interface can be user-friendly even tough it's basic. It can improve further with beautiful graphics and animations but this is something I wont focus on initially.

Things like user accounts, backing up progress, connecting with friends and keeping exercises up to date (downloaded geo-data) are all important topics but will likely fall outside the scope of this project.

Timeline
Write report: continuously
Existing applications study: week 19-20
Functional/non-functional requirements: week 21
Design application, create mockups: week week 22-23
Geo-data extraction: week 24-26
Application implementation: week 27-30
Testing, evaluation: week 31
Finishing report: week 32-33